

EXHIBIT A  
ENVIRONMENTAL ASSESSMENT OF PROPOSED GEODUCK HARVEST  
IN PIERCE COUNTY, MAHNCKES 2-4 GEODUCK TRACT (#12950)

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**Commercial geoduck harvest is jointly managed by the Washington Departments of Fish and Wildlife (WDFW) and Natural Resources (DNR) and is coordinated with treaty tribes through annual harvest management plans. Harvest is conducted by divers from subtidal beds between the minus 18 foot (corrected to mean lower low water - MLLW) and the minus 70 foot water depth (at any tide height). Harvest is rotated around Puget Sound in six geoduck management regions. The fishery, its management, and its environmental impacts are presented in the Final Supplemental Environmental Impact Statement for the Puget Sound Commercial Geoduck Fishery (WDFW & DNR, May 2001). The proposed continued harvest in Pierce County is described below.**

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Proposed Harvest Dates:      January 1, 2004 to December 31, 2009

Tract name:                    Mahnckes 2-4 (Tract #12950; 2002 Geoduck Atlas, WDFW), hereafter called Mahnckes tract

Description ( Figure 1):

The Mahnckes geoduck tract was re-surveyed in the year 2000 by WDFW and additional subtidal geoduck bed along the eastern side of Pitt Passage is included in the commercial tract area. The tract area available to non-Indian harvest is approximately 103 subtidal acres within Pitt Passage (between McNeil Island and Key Peninsula). The tract begins about 400 yards northeast of Mahnckes Point (Key Peninsula) and extends northeast about 2300 yards to a narrow, shallow passage about 660 yards southerly of Pitt Island and then extends southerly about 1300 yards to a point about 220 yards north of Hogan Point, McNeil Island.

The commercial tract area is deeper than and seaward of the minus 18 foot (MLLW) depth contour. The commercial tract area is also seaward of a line 200 yards seaward and parallel to the ordinary high tide (OHT) line. Most of the Mahnckes nearshore tract boundary line is the line 200 yards seaward and parallel to the OHT line.

The Mahnckes geoduck tract is inside and bounded by lines from a point at 47° 12.453' N, 122° 44.113' W on the line 200 yards seaward and parallel to the OHT line projected northeasterly along the line 200 yards seaward and parallel to the OHT line, or minus 18 foot (MLLW) depth contour, (whichever is farther from shore) to a point at 47° 13.148' N, 122° 43.205' W where the 200 yard from OHT line intersects the minus 18 foot (MLLW) depth contour; then easterly across the north/central portion of Pitt Passage along the

minus 18 foot (MLLW) contour to a point at 47 13.041' N, 122 43.008' W where the minus 18 foot (MLLW) depth contour intersects the 200 yards from OHT line; then southwesterly along the line 200 yards seaward and parallel to the OHT line to a point at 47 12.600' N, 122 43.500' W on the line 200 yards seaward and parallel to the OHT line; then north to a point at 47 12.625' N, 122 43.500' W on the minus 70 foot (MLLW) depth contour; then northeasterly, turning northerly, turning westerly, and turning southwesterly along the minus 70 foot (MLLW) depth contour to a point at 47 12.606' N, 122 43.778' W on the minus 70 foot (MLLW) depth contour; then southwesterly along a straight line to a point at 47 12.512' N, 122 43.917' W on the minus 70 foot (MLLW) depth contour; then southwesterly along the minus 70 foot (MLLW) depth contour to a point at 47 12.434' N, 122 44.075' W on the minus 70 foot (MLLW) depth contour; then northwesterly to the point of origin (positions reported in North American Datum, 1927 and decimal minutes).

For purposes of determining tract area, except as noted, the minus 70 foot contour corrected to MLLW is used. The maximum allowable fishing depth during harvest is minus 70 foot uncorrected to MLLW.

#### Substrate:

Geoducks are found in a wide variety of sediments, ranging from soft mud to gravel. The most common sediments where geoducks are harvested are sand with varying amounts of mud and/or gravel. The specific sediment type of a bed is primarily determined by the water current velocity. Coarse sediments are generally found in areas of fast currents and finer (muddier) sediments are found in areas of weak currents. The major impact of harvest will be the creation of small holes where the geoducks are removed. The holes fill in within a few days to several weeks and have no long-term effects. The substrate holes refill in areas with strong water currents much faster than in areas with weak currents.

Water currents are moderately strong in Pitt Passage. Currents of up to 1.4 knots occur at maximum ebb near Pitt Island (tidal current tables 2000 National Oceanic and Atmospheric Administration).

Mahnckes tract has uniform substrate of sand and mud throughout most of the area. In the northern and central portion of the tract; near the middle of the channel where water currents are strong; some gravel, cobble, and occasional boulders occur (Stations 39, 40, 46, 48, and 83). Laminarian algae, red algae (Rhodophyta), and Desmarestian algae were observed on these stations. The observation of piddocks ( a burrowing clam) on station 46 indicates a firm underlying substrate (clay or hardpan) at the end of this transect.

#### Water Quality:

Water quality is good at the Mahnckes tract. Water at this tract is affected by turbulence at the Tacoma Narrows, Balch Passage, and Pitt Passage which prevents stratification (water layering) and brings deeper nutrient-rich waters to the surface. As a result, the water quality in this area is high. At a water quality station in Drayton Passage, the minimum dissolved oxygen concentration is between 6.0 and 6.9 mg/l with salinities greater than 25 ppt at the surface. Maximum water temperatures at the surface range from 15-17° C.

This tract has been reviewed by the Department of Health (DOH) and has been classified as "approved" (Woolrich, pers. comm. 4/27/01). This tract is also classified as an "approved" tract in the DOH annual shellfish inventory. Non-tribal and tribal harvest have occurred in recent years on this tract, and geoduck harvest is ongoing.

#### Biota:

##### Geoduck:

The Mahnckes tract is approximately 149 acres and contains an estimated 1,897,000 pounds of geoduck clams. The Mahnckes tract available for non-Indian harvest is approximately 103 acres. If one assumes that all state and tribal harvest since the year 2000 survey came exclusively from the non-Indian portion (103 acres), then a conservative estimate of geoduck biomass remaining on the non-Indian portion is 580,058 pounds of geoducks (Table 1). In practice, the harvest was proportioned between the area within the -18 foot (MLLW) and the 200 yard from OHT contour and the rest of the tract. So, the remaining biomass on the non-Indian portion could be significantly higher than 580,058 pounds.

Geoducks at this location are considered commercial quality (Table 2). The geoduck density was moderate to high, averaging 0.19 geoducks/square foot based on the 2000 WDFW tract survey. The current geoduck density (estimated by subtracting geoducks harvested from the 2000 tract survey estimate) is low to moderate, averaging 0.05 geoducks/square foot. This density estimate assumes that all harvest, since the year 2000 tract survey, was taken from the 103 acre area available for non-Indian harvest. The average density range from the 2000 survey was 0.001 geoduck/square foot at station 83 to 0.719 geoducks/square foot at station 57 (Table 3). The geoducks on the Mahnckes tract are large, averaging 2.7 pounds compared to the Puget Sound average of 2.0 pounds per geoduck clam. The lowest average whole weight was 2.07 pounds per geoduck at

station 20 and the highest average whole weight was 3.31 pounds per geoduck at station 56 (Table 4).

Mahnckes (#12950) was fished in 1980 and again in 1984 with a reported total catch of 1,404,000 pounds. The tract was resurveyed in 1993 and re-fished. Reported tribal and non-tribal harvest from 1993 through 1999 totals 1,164,479 pounds (as reported on fish receiving tickets). In the year 2000 there was no fishing on this tract due to uncertainty about the remaining biomass on the tract. A survey was conducted in 2000 by WDFW and an additional area in Pitt Passage, north of Hogan Point, was found to contain geoducks and this area was added to the existing tract. The new biomass estimate for the entire area surveyed in 2000 and included in the Mahnckes 2-4 tract, and which is available to non-Indian harvest, was 2,339,854 pounds. Harvest in 2001 through 2003 totals 1,759,796 pounds and the estimated remaining biomass is 580,058 pounds.

Geoduck harvest is managed for long term sustainable harvest. No more than 2.7% of the commercially fishable stocks are harvested (total fishing mortality) each year, in each harvest management region, throughout Puget Sound. The fishable portion of the total Puget Sound population for non-Indian harvest includes geoducks that are seaward of the 200 yards seaward of the ordinary high tide line (OHT) in water between minus 18 feet (corrected to MLLW) and minus 70 feet (uncorrected to MLLW). Other geoducks, which are not harvestable, are found inshore and offshore of the harvest areas. Observations in South Puget Sound show that geoduck populations continue to depths of 360 feet. Additional geoducks exist in polluted areas and are also unavailable for harvest, but continue to spawn and contribute to the total population.

The low rate of harvest is due primarily to geoduck's low rate of natural recruitment. WDFW has studied the regeneration rate of geoducks on certain tracts scattered throughout Puget Sound. The estimated average time to regenerate a new crop of geoducks after removal of 100 percent of the original geoducks is 39 years. The longest regeneration time is 73 years, and the shortest regeneration time was 11 years. In actual fishing 100 percent of the geoducks are never removed. The average percentage removal on the tracts in the study was 69 percent. The regeneration research to empirically analyze tract recovery rates is continuing.

#### Fish:

Geoduck beds are generally devoid of rocky outcroppings and other relief features that attract or support fish. The bottoms are relatively flat and composed of soft, unstable sediments which provide few attachments for macroalgae and few vertical structures which attract fish. As noted in the above section describing tract substrate, cobble and boulders were observed on 5 out of 37 transect stations during the 2000 tract survey (Table 3). Laminarian algae, red algae (Rhodophyta), and Desmarestian algae were

macroalgae types observed on these five stations. Sculpins and unidentified flatfish were observed on two of these five stations (#39 and #83).

Very few fish species were observed in the 1993 and 2000 tract surveys. The only ones observed were various species of flatfish, sculpins, skates, and ratfish egg cases. Skates and ratfish egg cases were only observed during the 1993 survey and were not observed during the 2000 survey.

WDFW marine fish managers were asked of their concerns of any possible impacts on groundfish and flatfish that the proposed geoduck fishing would have. In letters dated June 8, 1992, June 10, 1992, and July 27, 1994, Greg Bargmann and Duane Day stated that no problems should occur to marine fish stocks or fisheries due to geoduck fishing at this tract. WDFW marine fish managers have not altered their opinion regarding the geoduck fishery since the 1993 fishery began on this tract. Geoduck harvest should not affect any recreational or commercial groundfish fisheries in the vicinity of this tract. Geoduck harvest is not in the vicinity of any documented herring spawning. There is no concern among WDFW marine fish managers as long as the minimum harvest depth of -18 ft. (MLLW) is adhered to.

Seven marine fish species were recently considered for listing under federal Endangered Species Act (ESA). In November 2000, the National Marine Fisheries Service determined that three of the seven species - Pacific cod, Pacific hake and walleye pollock - did not need ESA protection. In April 2001, NMFS announced that the remaining four species under consideration - cooper rockfish, quillback rockfish, brown rockfish, and Pacific herring - are also relatively stable or are increasing with existing conservation measures in place. Geoduck fishing on the Mahnckes tract should have no detrimental impacts on Pacific herring, surf smelt, or sand lance spawning.

Two salmon populations, Puget Sound chinook salmon and Hood Canal summer run chum salmon, were listed by the National Marine Fisheries Service on March 16, 1999 as threatened species under the federal Endangered Species Act. Critical habitat for summer run chum salmon populations include all marine, estuarine, and river reaches accessible to the listed chum salmon between Dungeness Bay and Hood Canal and within Hood Canal. The timing for summer run chum spawning is early September to mid-October. Out-migration of juveniles has been observed in Hood Canal during February and March, though out-migration may be as late as mid-April. The Mahnckes tract is outside of the critical habitat range for Hood Canal summer run chum salmon.

Critical habitat for Puget Sound Chinook salmon include all marine, estuarine and river reaches accessible to listed chinook salmon in Puget Sound. WDFW recognizes 27 distinct stocks of chinook salmon; 8 spring-run, 4 summer-run, and 15 summer/fall and

fall-run stocks. The existence of an additional five spring-run stocks is in dispute. The majority of Puget Sound chinook salmon emigrate to the ocean as subyearlings.

Streams or tributaries near the Mahnckes geoduck tract are McAllister Creek (approximately 7.6 miles from the tract), Nisqually River (approximately 7.7 miles from the tract), and Chambers Creek (7.2 miles). Two runs of chinook salmon have been identified in the Nisqually River basin. The status of the Spring/Summer run of chinook salmon in the Nisqually River basin is extinct (NMFS, Appendix E, TM-35, Chinook Status Review). The status of the natural Summer/Fall run of chinook salmon in the Nisqually River basin is mixed native and non-native origin; a composite of wild, cultured, or unknown/unresolved production; and healthy with a 5-year geometric mean for total estimated escapement at 699 fish (NMFS, Appendix E, TM-35, Chinook Status Review).

The geographic separation (horizontal) of this tract from known spawning tributaries and vertical separation of geoduck harvest (deeper and seaward of the -18 ft. MLLW contour) from juvenile salmon rearing areas and migration corridors (upper few meters of the water column) reduces or eliminates potential impacts to salmon populations. Charles Simenstad from the University of Washington School of Fisheries stated that the "exclusionary principle of not allowing leasing/harvesting in water shallower than -18 ft. MLLW or (within) 200 yards from shore; 2 ft. vertically from elevation of lower eelgrass margin, and within any regions of documented herring or forage fish spawning should under most conditions remove the influences of harvest induced sediment plumes from migrating salmon." Geoduck harvest should have no impact on salmon populations.

#### Invertebrates:

Many different kinds of invertebrates which are frequently found in geoduck beds throughout Puget Sound were observed on the tract. The most common and obvious of these include: [1] mollusks - horse clams, cockles, hardshell clams, geoducks, false geoducks, piddocks, truncated mya clams (1993 survey), nudibranchs, moonsnails, and moonsnail egg cases; [2] crustaceans - graceful crab, red rock crab, Dungeness crab, decorator crab (1993 survey), hermit crab (1993 survey), ghost and mud shrimp, and unidentified shrimp (1993 survey); [3] echinoderms - sea cucumbers, sunflower stars, short-spined stars, sun stars (1993 survey), rose stars, leather stars, sand stars, false ochre stars, blood stars (1993 survey), and brittle stars (1993 survey); [4] cnidarians - seapens, seawhips, burrowing anemones, plumed anemones, striped anemones, and unidentified anemones (1993 survey); [5] tube dwelling polychaete worms - *Spiochaetopterus sp.* and *Phyllochaetopterus sp.*

Geoduck harvest has not been shown to have long-term adverse effects on these invertebrates. Geoduck harvest can depress some benthic invertebrates; however, most of these populations recover within one year.

WDFW and DNR have studied the effects of geoduck harvest on the population of Dungeness crab at Thorndyke Bay in Hood Canal. The results of 4.6 year study have shown no adverse effects on crab catch-per-unit-effort due to geoduck fishing. Dungeness crab were observed during 3 of 37 transect stations on this tract. This area is not considered to be significant Dungeness crab habitat by WDFW crustacean biologists.

To determine the potential impacts to Dungeness crab, the percentage of substrate disturbed during fishing was calculated and compared to the entire crab habitat within Pitt Passage in the vicinity of the tract the tract deeper than the +1 foot tide level (Figure 3). Dr. Dave Armstrong at the University of Washington has determined that Dungeness crab utilize Puget Sound bottoms from the +1 foot level out to the minus 330 foot level. The entire crab habitat in the vicinity of this geoduck bed is approximately 370 acres. From the most recent survey in 2000, there was an estimated 856,000 harvestable geoducks on this tract. With a harvest of 85 percent of these geoducks, the total number harvested would be 727,600 geoducks. Approximately 1.18 square feet of substrate is disturbed for every geoduck harvested, so  $727,600 \times 1.18 = 858,568$  square feet of substrate. This equals 19.7 acres. This is about 5.3 percent of the total available crab habitat in the vicinity of this tract. This is a moderate amount of disturbance to the crab habitat in the immediate vicinity of this geoduck tract. Based on the low abundance of Dungeness crab observed during SCUBA surveys, plus the lack of effects observed at the Thorndyke Bay study, we conclude that any effects on Dungeness crab will be very minor, if they occur at all.

Red rock crab (*Cancer productus*) were observed on 20 of 37 transects (54% of the transects observations on Mahnckes tract had red rock crab listed). The study at Thorndyke Bay (Armetta Cain, January 1995) found no significant difference in red rock crab Catch Per Unit Effort (CPUE) on a tract prior to geoduck fishing, during geoduck fishing, and following geoduck fishing. Based numerous observations of red rock crab within the Mahnckes tract, and the moderate amount of disturbance noted above, there is a potential for impacts to red rock crab populations in the vicinity of the Mahnckes tract. The impacts will likely not be significant if the findings of the Thorndyke Bay study apply to the Mahnckes tract location. Since the abundance of red rock crab at the Thorndyke Bay study was notably less (12% of pre-fishing geoduck survey transects had red rock crab observations) it is uncertain that the conclusions will be the same. A controlled study of red rock crab CPUE prior to harvest, during harvest, and following harvest is recommended for this area of South Puget Sound.

In a note dated April 25, 2001 the WDFW Region 6 Shellfish Manager, Brad Sele, stated that there are no specific shellfish concerns regarding the proposed geoduck harvest at the Mahnckes geoduck tract.

#### Aquatic Plants:

Large quantities of attached aquatic plants are not generally found in geoduck beds. Light restriction often limits plant growth to areas shallower than where most geoduck harvest occurs. Aquatic plants observed in the geoduck surveys include: Laminarian algae, *Sarcadiothea* sp., *Pleurophycus* sp., *Opuntiella* sp., Desmarestiales, *Gigartina papillata*, a diffuse diatom layer, and various species of foliose red algae.

WDFW completed eelgrass surveys at the Mahnckes tract on May 5, 1993; and August 16 and August 23, 2000. The conclusion of this work was that no eelgrass was observed deeper than the -16 foot level (corrected to MLLW). Therefore, the shallow boundaries of this tract is set at no shallower than the -18 foot level to conform with state statute (RCW 77.60.070).

#### Marine Mammals:

Seals are common inhabitants of South Sound and are frequently observed in the vicinity of this geoduck bed. No conflicts have been observed between marine mammals and geoduck harvest.

#### Birds:

A variety of marine birds are observed in South Puget Sound. These include birds such as murres, murrelets, grebes, loons, scoters, dabbling ducks, mergansers, buffleheads, cormorants, and gulls. Blue heron are also common along the shores of this area. Geoduck harvest does not appear to have any significant effect on these birds or their use of the waters where harvest occurs. Bald eagles are also present in the area of this tract. A study by DNR and WDFW was conducted at northern Hood Canal to learn the effects of geoduck fishing on bald eagles (Watson et. al., 1995). A significant conclusion of this study is that commercial harvest of geoduck is unlikely to have any adverse impacts on bald eagle productivity.

#### Other uses:

#### Adjacent Upland Use:



The upland properties adjacent to the Mahnckes tract are designated rural. The upland property at McNeil Island, along the eastern portion of the Mahnckes tract, is part of the McNeil Island Correctional Center. For security purposes, the correctional center has posted signs which require vessels to stay at least 100 yards away from the shore. Non-Indian geoduck harvest is not allowed shoreward of the 200 yards seaward of the ordinary high tide (OHT) line and will not infringe on the McNeil Island security buffer.

To minimize possible disturbance to adjacent residents, harvest is not allowed within 200 yards of the ordinary high tide line (OHT) or shallower than -18 feet (MLLW) whichever is farther seaward. Harvest is only allowed during daylight hours, and no harvest is allowed on Saturdays, Sundays, or state holidays.

The only visual effect of harvest is the presence of the harvest vessels on the tract. These 35-40 foot boats are anchored during harvest and all harvest is conducted out of sight by divers. Noise from the boats, compressors and pumps may not exceed 50 dBA measured 200 yards from the noise source, 5 dBA below the state noise standard.

#### Fishing:

This area is not a prime sportfishing area, however, some recreational salmon fishing could occur seasonally in proximity to the geoduck bed. The WDFW 2004/2005 Sport Fishing Rules pamphlet describes additional seasons, size limits, daily limits, specific closed areas, and additional rules for salmon and other marine fish species. A few small-scale commercial fisheries may take place in the area. The fishing which does occur should not create any problems for the geoduck harvesting effort in the area.

Geoduck fishing on this tract is managed in coordination with the southern Puget Sound treaty tribes through annual state/tribal harvest management plans. The non-Indian geoduck fishery should not be in conflict with any concurrent tribal fisheries.

#### Navigation:

Pitt Passage is not a major navigational route for recreational or commercial vessels traveling between ports in southern and northern Puget Sound. Pitt Passage is however, the most convenient route between Drayton Passage and Carr Inlet. The passage is shallow and is used primarily by small shoal draft boats. Geoduck harvesting at this site should not result in any significant navigational conflicts. The Department of Natural Resources will notify the local boating community, the U.S. Coast Guard for inclusion in the Notice to Mariners, the local Port authority, and the N.W. Vessel Pilots Association prior to harvests.

**Summary:**

The continued commercial geoduck harvest is proposed for the Mahnckes 2-4 geoduck tract located in Pitt Passage. The tract was most recently surveyed in the year 2000 and the tract biomass estimate is based on the most recent survey and geoduck harvest in 2001 through 2003. The anticipated environmental impacts of this harvest are within the range of conditions discussed in the Final Supplemental Environmental Impact Statement for the commercial geoduck clam fishery. To reduce possible impacts to baitfish and eelgrass, harvest will be deeper and seaward of the -18 foot (MLLW) contour. There are potential impacts to red rock crab populations in the vicinity of this tract due to the high incidence of red rock crab and the relatively limited crab habitat area inshore and off-shore of the tract. No other significant impacts are expected from this harvest.

Date prepared: August 18, 2004

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